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HEADQUARTERS
QUALITY SYSTEM MANUAL

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Headquarters Quality System Manual

APPROVAL

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Approved by

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PREFACE

The NASA Headquarters Quality System implements the policy for quality in the accomplishment of NASA's recent initiatives for its Strategic Management Process at Headquarters. The Quality System shall be in conformance with the International Organization for Standardization's 9001 (also referred to as ISO 9001) requirements for quality systems. This Quality System Manual (QSM) defines the quality system, which ensures the proper execution of the NASA Strategic Management Process. Headquarters includes Agency-level management and the leadership functions for four Strategic Enterprises which are responsible for determining the programs and activities that implement NASA's mission, goals, and objectives to serve its customers. The support system for the Enterprises are four Agencywide crosscutting processes. The QSM implements the *NASA Strategic Plan, Strategic Management Handbook (SMHB),* the *NASA Performance Plan, Program/Project Management*, and other higher level NASA-wide directives which form the basis for the ways Headquarters conducts business.

This QSM includes only phase I of the effort to fully implement and integrate NASA's strategic management direction in conformance with ISO 9001 requirements. The focus of phase I covers the Headquarters Strategic Enterprises processes which directly affect the quality of their products. By definition, NASA's Strategic Enterprises are the "primary business areas for implementing NASA's mission and serving customers[1]."

A second implementation phase is anticipated at a later date which will include the processes of the Headquarters staff and functional offices. That phase of the implementation is not covered in this manual.

The QSM is not intended to duplicate nor contradict any other policy, procedure, or guideline. As such, the QSM will reference prevailing documents in which a topic is addressed and existing coverage is deemed adequate. Information provided within is intended to be supplemental.

The Headquarters Executive Management Representative is responsible for maintenance of this QSM. The controlled version of the manual is available on the world wide web via the Headquarters ISO 9000 Document Library for the Quality System at *http://hqiso9000.hq.nasa.gov.* By definition, any printed version of this QSM is uncontrolled. Revisions to this manual shall be made as the Headquarters Quality System matures. Any proposed revision to this manual is to be submitted to the Associate Deputy Administrator. The Associate Deputy Administrator authorizes

[1] Reference NPG 1000.2, *NASA Strategic Management Handbook,* para 3.3.1

approval of the revision after an internal review by the Document Control Board, chaired by the Executive Management Representative. (see paragraph 4.5.)

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1.0 SCOPE

The Headquarters QSM applies to Headquarters management of NASA's Strategic Enterprises. Specifically, it applies to the management of NASA's Scientific Research, Space Exploration, and Technology Development and Transfer missions.

This QSM is designed to provide information for the organizational structure, responsibilities, procedures, processes, and resources for implementing the Strategic Management Process at NASA Headquarters in conformance with ANSI/ISO/ASQC Q9001-1994, herein referred to as ISO 9001, and NPD 8730.3, *NASA Quality Management System Policy (ISO 9000)*, and is organized to parallel applicable sections of each. The QSM is intended to be a "what" document, not a "how to," addressing the overall policy and referencing other documents which provide implementing guidance. Headquarters Common Processes (HCP) and Office Work Instructions (OWI) will constitute the mechanism describing "how" work is performed at Headquarters. (see paragraph 3.3 and 3.4)

2.0 REFERENCES

The following documents contain provisions that, through reference in this QSM or in policy or procedure documents, constitute the basis for the QSM:

NPD 1000.1	*NASA Strategic Plan*
NPG 1000.2	*NASA Strategic Management Handbook (SMHB)*
NPD 7120.4	Program/Project Management
NPG 7120.5	NASA Program and Project Management Processes and Requirements
	NASA Performance Plan
	Enterprise Strategic Plans
ANSI/ISO/ ASQC Q9001-1994	*American National Standards Institute, Quality Systems-Model for Quality Assurance in Design, Development, Production, Installation, and Servicing*
ANSI/ASQC 8402:1994	*Quality Management and Quality Assurance - Vocabulary*
NPD 8730.3	*NASA Quality Management System Policy (ISO 9000)*
NHB 1101.3	*NASA Organization*
NPG 1441.1	*Records Retention Schedules*
HQPC 1150.1	*Headquarters Quality Council*
HCP1400-1	*Document and Data Control*
HCP1280-2	*Corrective and Preventive Action System*
HCP1280-3	*Internal Quality Audits*
HCP3410-4	*Employee Training*

For definitions and acronyms, refer to appendix A.

3.0 HEADQUARTERS STRATEGIC MANAGEMENT PROCESS IMPLEMENTATION REQUIREMENTS

NASA established a Strategic Management Process which provides for the fulfillment of customer-focused strategic plans that align Agency activities with its mission and concrete goals. The system is defined in the *NASA SMHB*. (NPG 1000.2). NASA executes its mission and achieves its goals by performing the Agency's four crosscutting processes in its programs and projects. The programs and projects are defined and managed by four Strategic Enterprises:

1) Space Science,
2) Earth Science,
3) Human Exploration and Development of Space, and
4) Aero-Space Technology.

NASA's four Agencywide crosscutting processes and their documentation are as follows:

1) Manage Strategically - NPG 1000.2,
2) Provide Aerospace Products and Capabilities - NPD 7120.4 and NPG 7120.5,
3) Generate Knowledge - under development (see NPG 1000.2), and
4) Communicate Knowledge - under development (see NPG 1000.2).

NASA established its Strategic Management Process consistent with the Government Performance and Results Act (GPRA) of 1993, which was enacted to improve Government performance by requiring Federal agencies to implement longer term strategic planning activities, to effectively measure program outcomes, and to systematically hold the agencies accountable for achieving program results. GPRA requires NASA to develop and update a 5-year strategic plan, prepare annual performance plans, and submit annual performance reports. GPRA obligates NASA to clearly ascertain and articulate its mission, long- and short-term goals and objectives, and the metrics to measure performance. The net result of these efforts is the publication of the *NASA Strategic Plan* and the annual *NASA Performance Plan*.

The *NASA Strategic Plan* details the Agency's mission, goals and objectives, as well as the mission, goals, and objectives of each Enterprise. The *NASA Performance Plan* outlines selected measurements to evaluate progress that the Agency intends to make in a given fiscal year toward the achievement of its goals. The *SMHB* details the Agencywide roles and responsibilities and requirements for NASA's Strategic Management Process, including the following:

1) Establishes a strategic framework;
2) Establishes a strategic management process;
3) Establishes roles, responsibilities, and an Agencywide strategic management organizational structure which--

- includes the Capital Investment Council,
- defines the roles of Headquarters Functional/Staff Offices,
- identifies NASA-wide crosscutting processes and their owners,
- clarifies the various roles of management within the Strategic Enterprises, and
- defines the roles of Centers and Center Directors;

4) Requires both NASA as a whole and the individual Strategic Enterprises to develop and maintain strategic plans, and perform capital investment planning;
5) Establishes an implementation planning process; and
6) Ties the strategic management process to performance evaluations at all levels.

The following paragraphs detail what the Strategic Management Process means to Headquarters Strategic Enterprises from a day-to-day standpoint:

1) roles and responsibilities,
2) key products and services, and
3) common and organizationally unique processes which directly affect the quality of Headquarters products and services.

3.1 Headquarters Strategic Enterprises Roles and Responsibilities

The NASA Organization Handbook (NHB 1101.3) provides the mission statements and sets forth the approved organizational charts for all Officials-in-Charge of Headquarters Offices. Headquarters roles and responsibilities are focused in three main areas: Agency management, Enterprise management, and Headquarters Operations. Both Agency and Enterprise management, on a NASA-wide level, are defined in the *SMHB*.

The Headquarters part of Enterprise management is a subset of managing an entire Strategic Enterprise. The Headquarters portion of the Enterprises is responsible for providing leadership for the entire Strategic Enterprise and for establishing Enterprise strategy and cross-program priorities. Their focus is primarily on external customers. They establish a process for gathering customer requirements, determining the strategic direction for the Enterprise, defining Enterprise programs, and assessing satisfaction levels while providing advocacy for the entire Strategic Enterprise. Roles of the Headquarters part of the Enterprises are detailed in the *SMHB*, paragraph 3.3.1.

3.2 Headquarters Strategic Enterprises Key Products and Services

NASA Headquarters has ultimate responsibility for designing the Nation's civil aeronautics and space program. To accomplish this effort, the Strategic Enterprises make a variety of significant decisions on a daily basis which affect NASA-wide

endeavors, as well as those of their customers and other stakeholders. These decisions are primarily related to the following:

1) Mid- and long-term strategies for implementing NASA's vision, mission, goals, and objectives in conjunction with the requirements of its customers and other stakeholders and funding made available through the appropriation process.
2) Policies, procedures, and guidelines which govern Agencywide delivery of technical and functional products and services.
3) Issues affecting the management of NASA.
4) NASA programs, i.e., starting new programs and continuing, modifying, or terminating existing programs.
5) NASA's pursuit of science and technology.
6) Long-term capital investments.
7) Issues affecting NASA's interests in science, technology, engineering management, space operations, information technology, and financial management.
8) Issues affecting key functional areas of interest primarily internal to NASA (but also of interest periodically to its customers and other stakeholders).
9) Issues affecting key activities within NASA's Centers.

The decisions made at Headquarters (HQ) are documented and distributed in various media. Examples include, but are not limited to the following:

1) NASA's Strategic Plan, Enterprise Strategic Plans, and Functional/Staff Office Implementation Plans.
2) Agencywide direction approved as NASA Policy Directive (NPD), NASA Procedures and Guidelines (NPG), NASA Policy Charters (NPC), and Headquarters-specific direction, e.g., HQPD's, HQPG's, and HQPC's, respectively.
3) Direction provided through the Senior Management, Program Management, and Capital Investment Councils, as well as other advisory councils of the Administrator.
4) Direction provided by individual Headquarters offices within the authority and responsibility of the individual organizations as stated in controlling documents.

Headquarters also provides advocacy, education, public outreach, and collaboration related to NASA-wide endeavors in scientific research, space exploration, and technology development and transfer. Advocacy focuses on advancing existing NASA activities and developing support for new NASA initiatives. Education focuses on transferring knowledge of NASA's accomplishments and endeavors to educational organizations. Public outreach focuses on demonstrating the usefulness of NASA's endeavors to the public at large. Collaboration focuses on working with other national

and international organizations to leverage NASA's investments and resulting contributions.

Products and services (both internal and external) within the scope of this manual are delivered through the implementation of effective, consistent, and repeatable processes to ensure quality. These processes form the basis of the Headquarters Quality System addressed in paragraph 4.0 below. There are two distinct types of processes in the Headquarters Quality System: Headquarters Common Processes and Office Work Instructions. Each type is described below.

3.3 Headquarters Common Processes (HCP)

HCP's are processes which shall be performed by more than one Headquarters organization. They were developed to meet our customer or supplier needs for consistency and repeatability across Headquarters. Quality System HCP's shall be established to ensure that processes for delivering Headquarters products and services are of the highest quality through conformance with the requirements of the ISO 9001 Quality System standard. Quality System HCP's include the following:

1) *Document and Data Control* - HCP1400-1,
0) *2) Corrective and Preventive Action System* - HCP1280-2,
3) Internal Quality Audits - HCP1280-3, and
4) Employee Training - HCP3410-4.

The current version of Quality System HCP's can be accessed on the Headquarters electronic document management system at *http://hqiso9000.hq.nasa.gov* . In addition, the Headquarters policy regarding Quality System HCP's, as well as other requirements of the Headquarters Quality System, are addressed in paragraph 4.0 below.

3.4 Office Work Instructions (OWI)

Headquarters OWI's document processes which are unique to an individual organization. OWI's shall be performed to ensure process consistency and repeatability. The documented processes shall be reviewed periodically to ensure that the products and services they produce are of the highest quality. Some OWI's document the office-unique processes to accomplish Quality System elements which have no corresponding HCP, and others document the business processes of that organization. All OWI's shall be compliant with Quality System HCP's. The current version of Headquarters OWI's can be accessed from the Headquarters electronic document management system at *http://hqiso9000.hq.nasa.gov*.

4.0 QUALITY SYSTEM REQUIREMENTS

A quality system intended to conform to the internationally recognized ISO 9001 standard has been implemented in the Headquarters Strategic Enterprises. The ISO 9001 standard contains 20 elements which form the basis of the Headquarters Quality System. Headquarters policy regarding these 20 elements is addressed below.

It is important to note that not all 20 elements are applicable to Headquarters products and services. Where an element is not applicable, a brief explanation is provided. Additionally, appendix B maps the Headquarters Quality System against the ISO 9001 quality system elements. In order to minimize the documentation required to conform with the ISO 9001 standard, an HCP only exists where it was determined that a common process was needed to conform to the standard. However, in order to readily determine the ISO 9001 element applicability to each OWI, a matrix is provided in appendices C-G which lists each OWI by organization, and the QSM elements which apply.

4.1 Establish Quality System Framework

This paragraph documents conformance to the ISO 9001, 4.1, Management Responsibility, quality system element.

4.1.1 Quality Policy

NASA Headquarters quality policy is to

"consistently deliver the cutting-edge, quality products and services required by our customers."

FIGURE 1. Headquarters Quality Policy

Each Headquarters manager shall be responsible for ensuring that the quality policy is understood, implemented, and maintained at all levels of the organization.

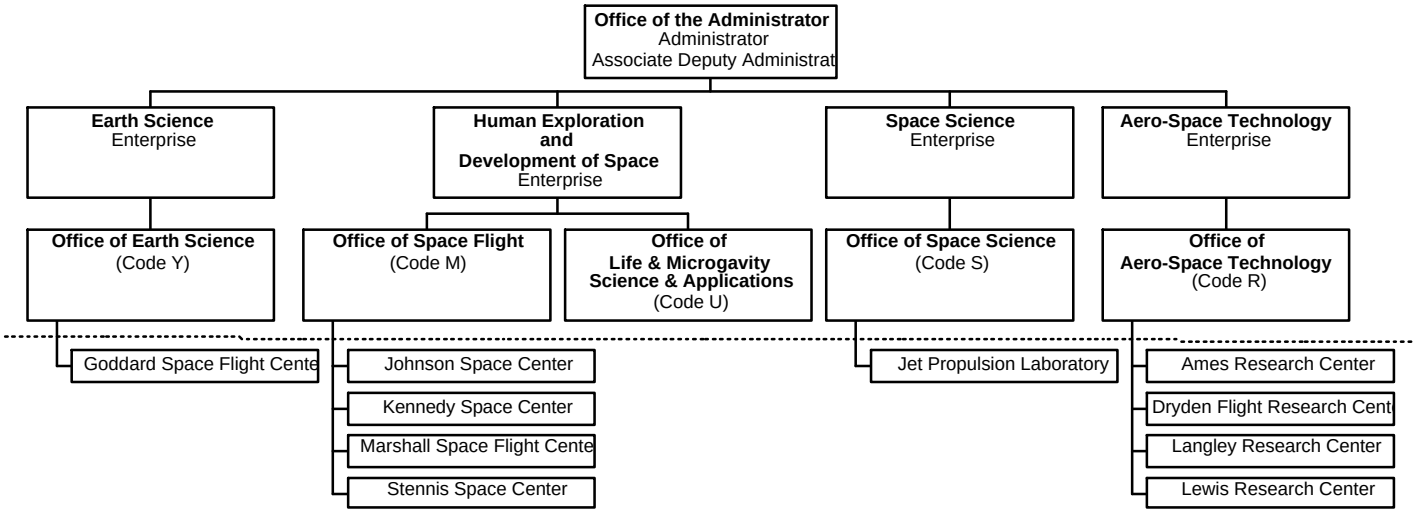
This quality policy will be communicated throughout the organization via orientation, communication media, employee training, and quality reviews with management.

Objectives to meet the Headquarters quality policy shall be determined by measuring the health of the Quality System. This shall be accomplished by evaluating the results of the internal quality audits (refer to HCP1280-3, Internal Quality Audits), results of actions assigned by the Quality Council (refer to HPC 1150.1, Headquarters Quality Council) and other metrics identified by the Quality Council which determine the status of the Quality System.

4.1.2 Organization

4.1.2.1 Responsibility And Authority

The Associate Deputy Administrator is the Official-in-Charge of the Headquarters Quality System. While the Associate Deputy Administrator has the ultimate authority and responsibility for establishing and maintaining the Quality System, the Executive Management Representative has the day-to-day authority and responsibility for implementation. All employees shall be responsible for understanding and complying with the Headquarters Quality System and policy. Officials-in-Charge of Headquarters offices may delegate authority for the quality system, but they will maintain the responsibility. Figure 2 depicts the Strategic Enterprises organizational relationships at



Headquarters.

FIGURE 2. NASA Headquarters Strategic Enterprises Organization Chart

Employee performance planning is the process by which employee performance elements are defined and assigned. Individual position descriptions document the responsibilities and authority of all personnel whose work affects product quality. Organizational charters are documented in the *NASA Organization* (NHB 1101.3).

4.1.2.2 Resources

The Associate Deputy Administrator shall be responsible for providing sufficient resources, including trained personnel (see paragraph 4.18); for management work performance; and for verification activities including internal quality system auditing (see *Headquarters Quality Council,* HPC 1150.1).

4.1.2.3 Official-in-Charge and Executive Management Representative

The Associate Deputy Administrator is the Official-in-Charge with the authority to develop, implement, and maintain the Headquarters Quality System, ensuring conformance with the requirements of the ISO 9001 standard.

The Associate Deputy Administrator has appointed an Executive Management Representative who ensures that a Quality System is established, implemented, and maintained in accordance with ISO 9001, reports on the performance of that Quality System, and recommends improvement to the Associate Deputy Administrator at management reviews. (see paragraph 4.1.3)

The Executive Management Representative delegated to the Director of the ISO 9000 Project Office the organizational authority to initiate action to identify and prevent Quality System problems; initiate, recommend, or suggest solutions through organizational functions; verify the implementation of these solutions; control further processing and delivery of nonconforming products until the deficiency or unsatisfactory condition is corrected; and record any problems relating to the product, process, and Quality System.

The ISO 9000 Project Office leads internal quality audits to ensure continuing conformance with the Quality System and establishes resource requirements for audits. The audit findings shall be given to the management personnel responsible for the area being audited, and a date for implementation of corrective action is determined by the responsible management.

4.1.3 Management Review

Management reviews of the Headquarters Quality System shall be conducted at Quality Council meetings as detailed in *Headquarters Quality Council* policy charter.

4.2 Define Headquarters Quality System

This paragraph documents conformance to the ISO 9001, 4.2, Quality System, quality system element.

4.2.1 General

A Quality System has been established, documented, and will be maintained at Headquarters as a means of ensuring that products and services conform to specified requirements. The quality system documentation hierarchy is illustrated in Figure 3 and defined as follows:

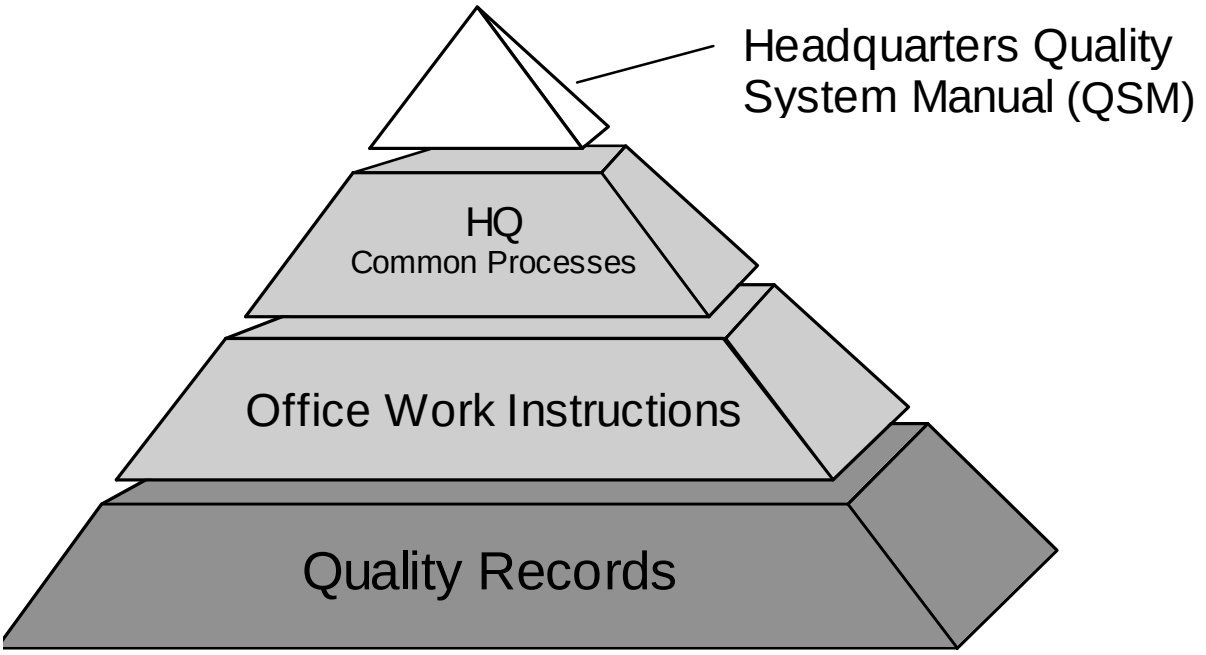


Figure 3. Headquarters Quality System Documentation Hierarchy

a) Level 1. The Headquarters QSM states the quality policies and objectives and describes the Quality System at Headquarters. The Headquarters QSM incorporates quality system procedures which are less complex or currently defined in other NASA documents (via cross-referencing), and references quality system procedures which are more complex in HCP's. The QSM also outlines the structure of the documentation used in the Quality System.

b) Level 2. HCP's as described in paragraph 3.3.

c) Level 3. OWI's as described in paragraph 3.4

d) Level 4. Records of quality, including documents such as reports, files, data sheets, letters, and forms, that provide objective evidence that quality requirements are documented and have been met and retained according to established procedures.

4.2.2 Quality System Procedures

Headquarters quality system procedures are provided in one of four ways as follows:

1) Reference to existing NASA documents in which the existing procedure provides the necessary control as defined by the ISO 9001 standard;
2) Reference to existing documents with supplementary procedures contained in either

the QSM or a separate HCP in which existing procedures fall short of providing the necessary control as defined by the ISO 9001 standard;
3) The QSM in which no existing procedure exists, and the procedure is not complex; or
4) An HCP where no existing procedure exists and the procedure is more complex.

In all cases, the QSM will either detail the quality system procedures or make reference to where applicable procedures can be found.

4.2.3 Quality Planning

Quality planning at Headquarters is performed in a manner consistent with all other requirements of the Quality System. Documentation and definition of how quality requirements are met shall be accomplished in several ways. Table 1 identifies the quality planning elements and the manner in which each is achieved in the Quality System.

Quality Planning Element	Reference
Preparation of quality plans (ISO 9001, 4.2.3.a)	- *NASA SMHB* (NPG 1000.2) - *NASA Strategic Plan* (NPD 1000.1) - *Enterprise Strategic Plans* - *Program/Project Management* (NPD 7120.4) - *NASA Program and Project Management Processes and Requirements* (NPG 7120.5)
Identification and acquisition of controls, processes, resources and skills (ISO 9001, 4.2.3.b)	- *QSM* Understanding Incoming Requirements (QSM paragraph 4.3)
Ensuring compatibility of design, process and documentation (ISO 9001, 4.2.3.c)	- *QSM* Control Product Design (QSM paragraph 4.4)
Updating quality control, inspection and testing techniques (ISO 9001, 4.2.3.d)	Not Applicable to Headquarters Quality System
Identification of measurement requirement (ISO 9001, 4.2.3.e)	Not Applicable to Headquarters Quality System
Identification of suitable verification at appropriate stages (ISO 9001, 4.2.3.f)	- *QSM* Control Processes (QSM paragraph 4.9)
Identification of acceptance criteria (ISO 9001, 4.2.3.g)	- *QSM* Control Product Design (QSM paragraph 4.4.5)
Identification and preparation of quality records (ISO 9001, 4.2.3.h)	- *QSM* Quality Records (QSM paragraph 4.16)

Table 1 - Quality Planning

The *NASA SMHB* lays the groundwork for NASA's Strategic Management Process. It provides NASA employees with policy and guidance for integrating quality planning at all levels of NASA into their long-term planning efforts. The *NASA Strategic Plan* defines NASA's overall vision, mission, goals, and objectives and provides a roadmap for future accomplishments. It also provides overarching goals and objectives for NASA's Strategic Enterprises. The *NASA Performance Plan*, submitted annually, defines performance goals and describes the performance measures and service levels for program activities.

Quality planning from a strategic perspective continues with *Enterprise Strategic Plans*. These plans expand on the *NASA Strategic Plan* by providing detailed quality planning guidance for each Strategic Enterprise. Quality planning from a program/project standpoint is governed by NPD 7120.4 and NPG 7120.5.

4.3 Understand Incoming Requirements

This paragraph documents conformance to the ISO 9001, 4.3, Contract Review, quality system element.

NASA's operational authority comes from the Space Act of 1958 (Public Law), congressional authorization and appropriation laws and supporting language. In essence, our mission is established, and specific requirements are defined by these laws. Contract review applies to Headquarters Strategic Enterprises in the following two ways:

1) To accepted work requirements implemented through congressional authorization and appropriation laws, and any clarifying documentation; and
2) To accepted reimbursable work requirements accepted through authority provided under Section 203(c)(3) of the National Aeronautics and Space Act of 1958, as amended (42 U.S.C. 2473).

Headquarters organizations shall ensure through Enterprise processes that--

1) Work requirements are understood prior to acceptance;
2) Any differences between Headquarters and the party levying requirements are resolved prior to acceptance;
3) Identification of how requirements are amended and correctly transferred to the functional elements concerned; and
4) The ability exists to meet the accepted requirements, both implied and explicit.

Headquarters organizations demonstrate understanding of incoming requirements through Enterprise processes which are directly impacted by congressional

authorization and appropriations laws and reimbursable work requirements (see appendices C-G).

4.4 Control Product Design

This paragraph documents conformance to the ISO 9001, 4.4, Design Control, quality system element.

4.4.1 General

Headquarters Strategic Enterprises have ultimate responsibility for designing the Nation's civil aeronautics and space program (see paragraph 3.2). Headquarters products are designed as specified in applicable OWI's. Designs shall ensure that products meet specified requirements. Specified requirements include incoming work requirements as defined in paragraph 4.3 and other relevant inputs specified in the Quality System documentation. OWI's shall document the procedures and control mechanisms implemented for the design of specific products in conformance with paragraphs 4.4.2 through 4.4.8.

4.4.2 Design And Development Planning

The planning process incorporates the records and inputs derived from incoming requirements (see paragraph 4.3) and the direction provided from quality planning (see paragraph 4.2.3.a) in the design and development of products. Documents referenced in the quality planning (see paragraph 4.2.3.a) and organizations' OWI's document the processes to be used during formulation.

4.4.3 Organizational And Technical Interfaces

Applicable OWI's define interfaces between groups performing design function required during product formulation. The OWI's identify the information which will be transmitted and regularly reviewed.

4.4.4 Design Input

Budget process OWI's identify incoming work requirements and limitations and define the resolution process of any ambiguous, incomplete, or conflicting requirements. Additional input factors to the design input phase shall be identified from Enterprise codes' OWI's. Any changes agreed to will be documented and approved in accordance with OWI guidance.

4.4.5 Design Output

Design output is typically represented in final draft output documents. The design output shall meet the design input requirements, contain or reference acceptance criteria, and identify critical design characteristics crucial to the product.

4.4.6 Design Review and Approval

Design reviews and approval processes shall be planned, conducted, and documented in accordance with OWI guidance. Design review participation shall include representatives of all appropriate functions concerned. Records of such reviews shall be maintained in accordance with OWI guidance. Design review is the mechanism to ensure that the product is verified, validated, and approved.

4.4.7 Design Verification

(see paragraph 4.4.6 Design Review)

4.4.8 Design Validation

(see paragraph 4.4.6 Design Review)

4.4.9 Design Changes

All changes and/or modifications to designs shall be identified, documented, reviewed, and approved prior to release in accordance with OWI guidance.

4.5 Control Documents And Data

This paragraph documents conformance to the ISO 9001, 4.5, Document and Data Control, quality system element.

4.5.1 General

Documented procedures have been established and shall be maintained at Headquarters to control all documents and data that are within the scope of Headquarters Quality System relating to the requirements of ISO 9001 including, to the extent applicable, documents of external origin such as standards and customer drawings. This includes the processes for preparing, reviewing, approving, releasing, distributing, changing, revising, tracking, maintaining, and canceling such documents as standards, handbooks, requirements documents, interface control documents, quality manuals and plans, procedures, forms, and instructions. HCP1400-1 addresses the QSM, HCPs, and OWIs. Each Headquarters organization is responsible for the establishment, maintenance, and control of organization unique documents and data to include distribution of documents and data of external origin. The use of the words "shall" or "will" indicates mandatory requirements.

4.5.2 Document And Data Approval And Issue

The documents and data shall be reviewed and approved for adequacy and accuracy prior to issue to perform work by authorized management, or designee, after having received concurrence from technical authorities and employee representatives performing the tasks. Each organization maintains the documents and data, such as procedures, instructions, and forms, or identifies the repository location of the

documents and data such that each employee who is performing the task can easily retrieve the applicable documents/data for use. These documents can be in the form of any type of media, such as hard copy or electronic. Electronic media is recommended when available. The documents shall be controlled using the document's title/subject, effective date, and the Office of Primary Responsibility's organizational code. A master list identifying the current revision status of documents shall be established for the QSM, HCPs, and OWIs by the Document Manager and be readily available to preclude the use of invalid and/or obsolete documents. This control shall ensure that--

1. Pertinent issues of appropriate documents are available at all locations essential to the effective functioning of the Quality System.
2. Invalid and/or obsolete documents are promptly removed from all points of issue or use, destroyed, or otherwise ensured against unintended use.
3. Any previous/obsolete version of any documents within the Headquarters Master List system retained by the user (e.g., for limited applicability, for historical purposes, for reference) will be either marked or otherwise suitably identified.

4.5.3 Document And Data Changes

Changes, revisions, and cancellations to documents and data shall be reviewed and approved by the same Headquarters organizations that performed the original review and approval, unless designated otherwise. The designated Headquarters organizations performing review and approval shall have access to pertinent background information upon which to base their review and approval. Where practicable, a description of the change shall be identified in the document or in the appropriate attachments.

4.6 Purchase Products and Services

This paragraph documents conformance to the ISO 9001, 4.6, Purchasing, quality system element.

The Headquarters Office of Space Science is the only organization within the scope of the Headquarters Quality System that directly purchases products and services as addressed in the above quality standard. Applicable processes within the Office of Space Science are identified in appendices C-G. The OWI's which document these processes provide direction to ensure conformance to the ISO 9001 standard.

Actual procurement of all other scientific research is provided by NASA's Goddard Space Flight Center (GSFC) in Greenbelt, Maryland, and as such, Headquarters is not subject to the ISO 9001, 4.6, Purchasing, quality system element. GSFC procurement personnel conduct purchasing in accordance with their documented procedures. Organizations involved in managing NASA's scientific research demonstrate process control (see paragraph 4.9) over the various science management processes through agreements with GSFC regarding the timeliness of procurement actions used to obtain

the science. Common agreements applied to all Headquarters procurement activities are detailed in a Memorandum of Understanding (MOU) between the Office of Headquarters Operations and GSFC. Depending on the type of procurement action, site-specific agreements shall be documented and agreed to by the organization requiring support and GSFC, e.g., schedule for completing a procurement action. Records of such agreements shall be kept by the organization and GSFC procurement personnel.

4.7 Control Customer-Supplied Product

Customer-supplied products are not incorporated into the supplies at Headquarters. As such, the ISO 9001, 4.7, Control of Customer-Supplied Products, quality system element does not apply to the Headquarters Quality System.

4.8 Identify And Trace Products

Headquarters Strategic Enterprise products are primarily represented in document format on a recurrent basis (see paragraph 3.2). Due to their nature, unique identifiers are automatically assigned to products reflecting their distinctiveness and schedule. These unique identifiers shall be ensured via the instructions provided in paragraph 4.9 of this manual. The ISO 9001, 4.8, Product Identification and Traceability, quality system element is not appropriate for the Headquarters Quality System.

4.9 Control Processes

This paragraph documents conformance to the ISO 9001, 4.9, Process Control, quality system element.

The management processes which directly affect quality at Headquarters have been identified and planned. The identification is documented in the QSM under paragraph 3.2, Key Products and Services, QSM paragraph 4.2.3, Quality Planning, and the HCP's.

4.9.1 Planning and Implementation

The planning and implementation of controlled conditions is ensured through the use of individual OWI's. OWI's are the detailed documents located within an organization's documentation structure that give the method for performing activities that directly affect product quality. Included in the OWI's are the references to any standards/codes, quality plans, and/or associated procedures (HCP's, NPD's, and NPG's) and the methods for monitoring and controlling process parameters. Included in the OWI's is the criteria for product workmanship, which is stipulated in a clear practical manner (e.g., flow charts, written standards, representatives samples, or illustrations).

4.9.2 Personnel Requirements

The requirements for any qualification of personnel is covered via position descriptions and shall be specified. (see paragraph 4.18)

4.9.3 Records

Records shall be maintained for qualified personnel, in accordance with HCP3410-4, Employee Training, referred to in paragraph 4.18. The results of reviews and assessments (see paragraph 4.9.4) shall be documented and retained as quality records (see paragraph 4.16).

4.9.4 Reviews, Assessments and Approval

Because products developed in Headquarters Strategic Enterprises are primarily documents (see paragraph 3.2), their conformance and adherence to prescribed requirements shall be determined via reviews and assessments as documented in applicable OWI's. These reviews and assessments serve as the mechanism to verify and validate that the products will meet their intended purpose. Approval of products is given, following the review and assessment, and is documented according to the procedures of the applicable OWI.

4.10 Inspect and Test Products

Because products developed in Headquarters Strategic Enterprises are primarily represented in document format (see paragraph 3.2), they do not warrant standard inspection activities as defined by the ISO 9001, 4.10, Inspection and Testing, quality system element. Products shall be reviewed and approved via the instructions provided in paragraph 4.9.4 of this manual.

4.11 Control Inspection, Measuring, And Test Equipment

Inspection, measuring, or test equipment in the production of products is not used at Headquarters. As such, the ISO 9001, 4.11, Inspection, Measuring and Test Equipment, quality system element does not apply to the Headquarters Quality System.

4.12 Status Product Inspection And Testing

Because products developed in Headquarters Strategic Enterprises are primarily represented in document format (see paragraph 3.2), they do not warrant standard inspection activities as defined by the ISO 9001, 4.12, Inspection and Test Status, quality system element. Products shall be statused via the instructions provided in paragraph 4.9.4 of this manual.

4.13 Control Nonconforming Product

Because products developed in Headquarters Strategic Enterprises are primarily represented in document format (see paragraph 3.2), product nonconformities identified do not warrant the application of the ISO 9001, 4.13, Control of Nonconforming Products, quality system element. Products shall be reviewed prior to release via the instructions provided in paragraph 4.9.4.

4.14 Correct and Prevent Quality System Problems

This paragraph documents conformance to the ISO 9001, 4.14, Corrective and Preventive Action, quality system element.

4.14.1 General

HCP1280-2, Corrective and Preventive Action, has been established and will be maintained at Headquarters to ensure consistent and effective methods for correction and prevention of recurrence of nonconformances. This is to ensure that nonconformances are corrected in the delivery of quality products to the customer. Any corrective or preventive action taken to eliminate the causes of actual or potential nonconformities shall be to a degree appropriate to the magnitude of problems and commensurate with the risks encountered. Any changes to the documented procedures as a result of corrective or preventive actions shall be recorded and implemented.

4.14.2 Corrective Action

Procedures have been established for the effective handling of customer concerns or complaints and reports of product nonconformances. (Refer to HCP1280-2, Corrective and Preventive Action.) Disciplined problem-solving methods shall be used during the investigation of the cause of the nonconformance. Results of the investigation and analysis shall be recorded (see paragraph 4.16). Procedures document corrective action needed to eliminate the cause of nonconformances and define corrective action followup activity to ensure that documented corrective action is taken and that it is effective.

4.14.3 Preventive Action

Procedures have been established for preventive action. Appropriate sources of information such as processes and work operations which affect product quality, concessions, audit results, quality records, and customer complaints to detect, analyze, and eliminate potential causes of nonconformances may be used. (Refer to HCP1280-2, Corrective and Preventive Action.) Steps needed to effectively deal with problems, requiring preventive action, shall be determined and initiated; controls shall be applied to ensure that preventive action is effective, and all relative information shall be

submitted for management review. Actions resulting from management reviews shall be deemed preventive actions for the Quality System. (see paragraph 4.1.3).

4.15 Handle, Store, Package, Preserve, And Deliver Products

Because products developed in Headquarters Strategic Enterprises are primarily represented in document format (see paragraph 3.2), they do not warrant the standard application of the ISO 9001, 4.15, Handling, Storage, Packaging, Preservation, and Delivery, quality system element. Therefore, this element is not applicable to the scope of Headquarters registration. In the event that a product is added that is in scope and aligns with the 4.15 quality element, procedures will be established and maintained that conform to the ISO 9001 standard.

4.16 Control Quality Records

This paragraph documents conformance to the ISO 9001, 4.16, Control of Quality Records, quality system element.

A quality record provides objective evidence of the fulfillment of Headquarters requirements for quality or the effectiveness of the operation of the Headquarters quality system. Quality records shall be those records identified in HCP and OWI documents. All quality records identified shall be legible and stored in a way that they are readily retrievable in facilities that provide a suitable environment to prevent damage, deterioration, or loss. Records may be in the form of any type of media, such as hard copy or electronic media. The template provided in HCP1400-1, Document and Data Control, section 7.0, establishes a baseline matrix to guide Strategic Enterprise codes in identifying quality records. Retention and disposition of quality records will follow the guidelines established in NPG 1441.1, Records Retention Schedules, or as otherwise specified by the process owner and shall be appropriately documented. The default retention period shall be established as 3 years, unless otherwise specified. Table 2 identifies the types of quality records within the Headquarters Quality System and the organizations responsible for collecting, indexing, accessing, filing, storing, maintaining and disposing of the records.

Type of Record	Responsible Organization(s)
Management Review Records (Quality Council)	- ISO 9000 Project Office *
Work Requirements Records (Contract Review)	- Strategic Enterprise codes
Design Records	- Strategic Enterprise codes
Process Records	- Strategic Enterprise codes
Corrective/Preventive Action Records 1) Quality System (General) 2) Product/Process Specific - Identified by audit - Identified by Product/Process Owner	 - ISO 9000 Project Office * - ISO 9000 Project Office * - Product/Process Owner
Internal Audit Records	- ISO 9000 Project Office *
Employee Training Records 1) Training coordinated by Headquarters Human Resources Management Division 2) On-the-job (OJT) training	 - Headquarters Human Resources Management Division - Single-letter code organization

***** (or equivalent organization)

Table 2 - Quality Records

Responsible organizations in Table 2 shall either have separate procedures for controlling quality records or shall identify the control of quality records within the OWI's. In addition, the responsible organizations listed above shall be responsible for purging obsolete records as they are identified.

4.17 Conduct Quality System Internal Audits

This paragraph documents conformance to the ISO 9001, 4.17, Internal Quality Audits, quality system element.

Documented procedures have been established and shall be maintained at Headquarters for planning and implementing internal quality audits. (Refer to HCP1280-3, Internal Quality Audits.) Headquarters shall plan and perform internal audits on a scheduled basis, according to the status and importance of the activity to determine the effectiveness of the Headquarters Quality System. The results shall be documented and maintained as quality records (see paragraph 4.16) and distributed to the manager responsible for the affected organizations. Nonconformances identified shall be tracked to ensure that timely corrective action is taken by the manager of the

affected area (see HCP1280-2, Corrective and Preventive Actions).

Headquarters Strategic Enterprises activities shall be audited by personnel independent of the activity under review for compliance with documented procedures, plans, instructions, and accepted customer agreements and to determine the effectiveness of the Headquarters Quality System.

Followup audits shall be performed by Headquarters to verify and record the implementation and effectiveness of the corrective action taken and shall be maintained as quality records (see paragraph 4.16). Corrective action commitments, made in response to audit findings, will be assessed to ensure the implementation and effectiveness of the action.

The results of the Headquarters internal quality audits will form an integral part of the input to management review activities (see paragraph 4.1.3).

4.18 Train Personnel

This paragraph documents conformance to the ISO 9001, 4.18, Training, quality system element.

Documented procedures have been established and shall be maintained at Headquarters that identify the training requirements and provide appropriate training of personnel performing services directly affecting quality. (Refer to HCP3410-4, Employee Training.) Personnel performing specific assigned tasks shall be qualified on the basis of appropriate education, training, and/or experience, as required. Appropriate training records shall be maintained as quality records (see paragraph 4.16).

4.19 Service Products

Because products developed in Headquarters Strategic Enterprises are primarily documents (see paragraph 3.2), they do not warrant standard servicing or maintenance as intended by the ISO 9001, 4.19, Servicing, quality system element.
As such, this ISO 9001 quality system element does not apply to the Headquarters Quality System.

4.20 Measure Performance

This paragraph documents conformance to the ISO 9001, 4.20, Statistical Techniques, quality system element.

4.20.1 Need for Statistics

The need for statistics to measure the performance of the Quality System has been identified at Headquarters in applicable OWI's and in the following activities:

1. Quality System Management Review - for statistical analysis of corrective actions, Quality System nonconformances, and trend analysis for preventive action items (see QSM paragraph 4.1.3),
2. Quality System Problem Correction and Prevention - corrective action tracking and analysis (see QSM paragraph 4.14),
3. Quality System Internal Audits - Quality System nonconformance analysis (see QSM paragraph 4.17).

4.20.2 Applications

Applications for the implementation and control of statistical techniques shall be found within the applicable OWI or the following element procedures:

1. Quality System Management Review	HQPC 1150.1
2. Corrective and Preventive Action System	HCP1280-2
3. Internal Quality Audits	HCP1280-3.

Appendix A - DEFINITIONS & ACRONYMS

In general, the definitions given in ANSI/ASQC 8402:1994 apply. However, the following definitions are offered to assist the user in understanding the application of the Strategic Management Process, as well as the ANSI/ISO/ASQC Q9001-1994 quality standard and the quality policies in this QSM:

Agency Crosscutting Processes - The key processes identified at the Agency level that Enterprises use to deliver products and services to customers.

ISO - The recognized short name for the International Organization for Standardization, an international agency consisting of member countries that each have one “equal” vote. The U.S. representative is the American National Standards Institute.

Key Process - A process which has a DIRECT impact on the quality of a product or service being provided by NASA Headquarters.

Process - Set of interrelated resources and activities which transform inputs into outputs. Resources may include personnel, finance, facilities, equipment, techniques, and methods.

Product - The result of activities or processes.

Quality System - A management tool which ensures that products and services conform to specified requirements.

Service - The results generated by activities at the interface between the supplier and the customer and by supplier internal activities to meet customer needs.

Strategic Management Process - The basis for NASA to manage its affairs effectively and efficiently.

Supplier - The organization that provides a product/service to the customer. Headquarters is the supplier to its customers.

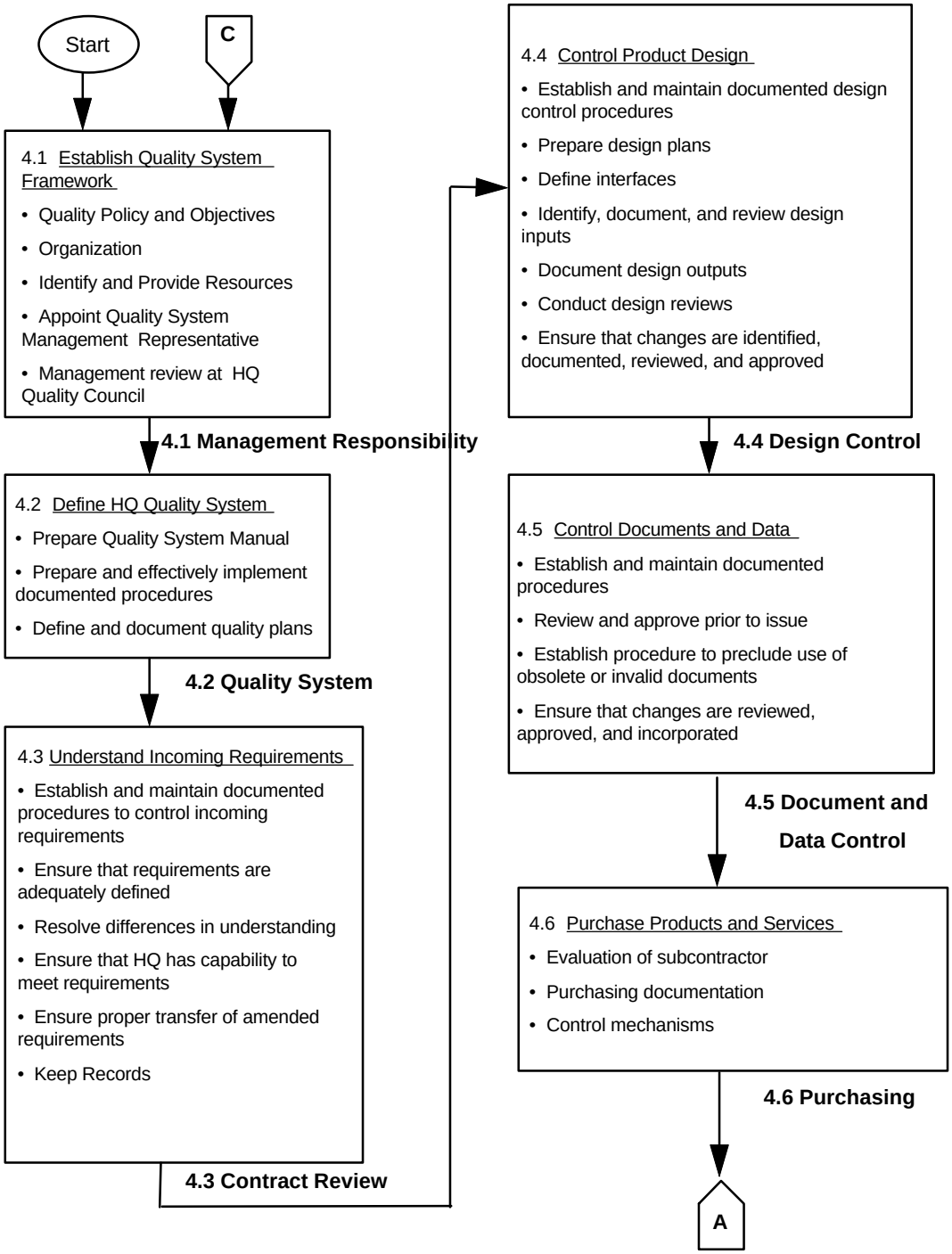
ANSI - American National Standards Institute
ASQC - American Society for Quality Control
GPRA - Government Performance & Results Act
GSFC - Goddard Space Flight Center
HCP - Headquarters Common Process
HQPC - Headquarters Policy Charter
HQPD - Headquarters Policy Directive
HQPG - Headquarters Procedures and Guidelines
ISO - International Organization for Standardization
MOU - Memorandum of Understanding
NHB - NASA Handbook
NPC - NASA Policy Charter
NPD - NASA Policy Directive
NPG - NASA Procedures and Guidelines
OHR - Office of Human Resources
OJT - On-the-job training
OWI - Office Work Instruction
QS - Quality System
QSM - Quality System Manual
SMHB - Strategic Management

Handbook

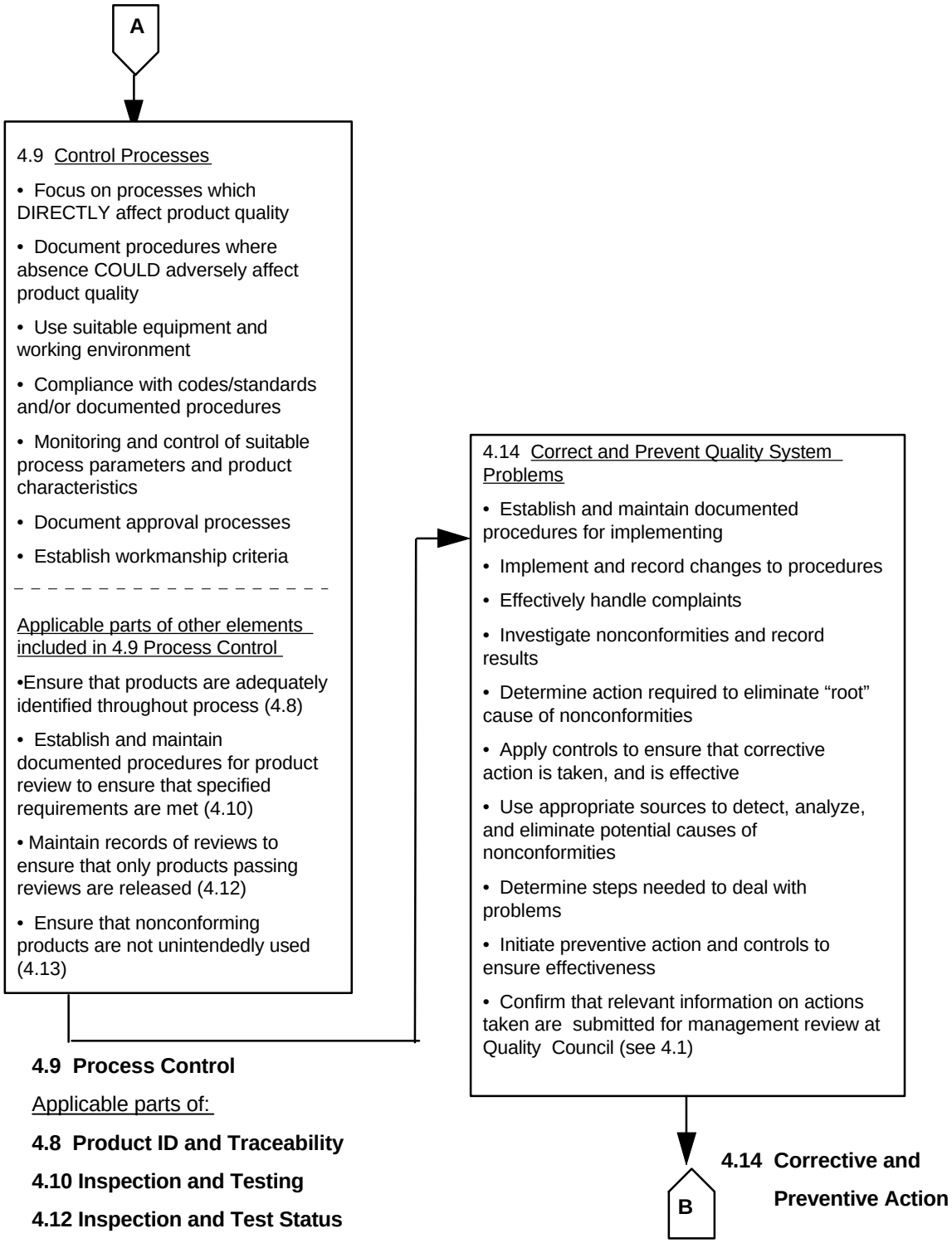
Appendix B - Quality System Element Crosswalk

Headquarters Quality System Element Crosswalk

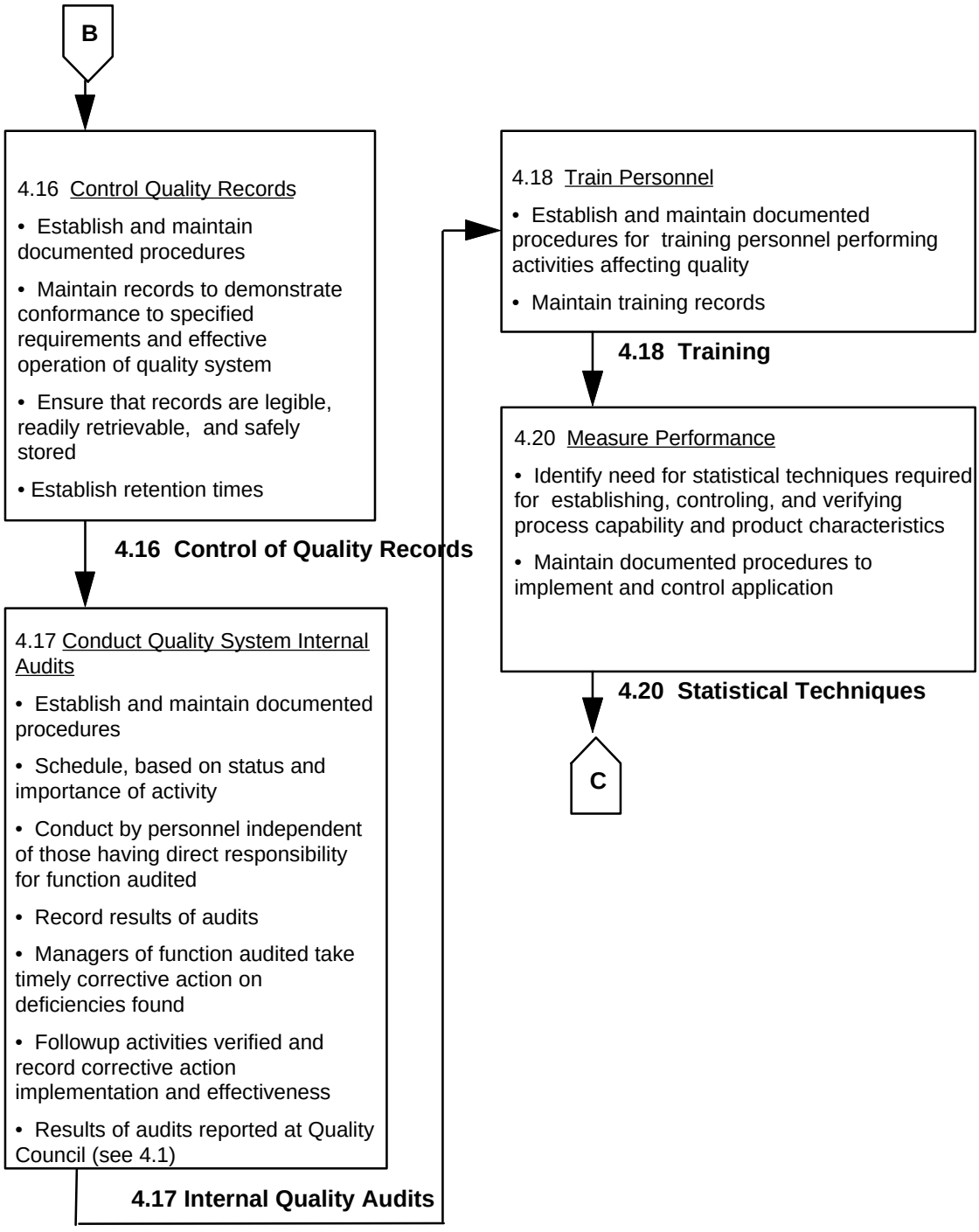
(ISO 9001 requirement highlighted next to activity **)**



Headquarters Quality System Element Crosswalk
(ISO 9001 requirement highlighted next to activity**)**



Headquarters Quality System Element Crosswalk
(ISO 9001 requirement highlighted next to activity)



Appendix C - QSM/OWI Matrix - Office of Space Flight

	Office Work Instructions		Quality System Manual Elements																		
Code M	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
HEDS Strategic Planning Process	x	x			x				x					x		x		x		
Policy Formulation and Dissemination Process	x	x			x				x					x		x		x		
External Directives Review	x	x			x				x					x		x		x		
Internal Directives Development	x	x			x				x					x		x		x		
Budget Formulation (Advocacy) Process	x	x	x		x				x					x		x		x		
Funds Control Process	x	x			x				x					x		x		x		
Congressional Hearing Support	x	x			x				x					x		x		x		
HEDS Exploration Technology Planning Process	x	x			x				x					x		x		x		
HEDS Outreach & Education Process	x	x			x				x					x		x		x		
Space Development Reqt. Definition & Assessment	x	x		x	x				x					x		x		x		
Customer/Space Comm. Reqts Serv. Process	x	x	x		x				x					x		x		x		
ELV Manifest Process	x	x			x				x					x		x		x		
DoD Secondary Payloads Reimbursable Process	x	x	x		x				x					x		x		x		
Shuttle Payload Manifest Process	x	x			x				x					x		x		x		
ISS Strategic Utilization Planning	x	x			x				x					x		x		x		
Spectrum Management/ Regulatory Policy Process	x	x			x				x					x		x		x		
NASA/DoD GPS Coordination Process	x	x			x				x					x		x		x		
Space Data Systems Standard Services Process	x	x			x				x					x		x		x		
Correspondence and Action Tracking	x	x			x				x					x		x		x		

Not Applicable

Appendix Revision Date:

Appendix D - QSM/OWI Matrix - Office of Life & Microgravity Science & Applications

Office Work Instructions — Quality System Manual Elements

Code U	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
OLMSA Input to HEDS & SA Strategic Plans	x	x			x				x					x		x		x		
Formulate OLMSA Policies	x	x			x				x					x		x		x		
Formulate Agency Occup Health Stds & Policies	x	x			x				x					x		x		x		
Formulate Agency-Level Medical Policy	x	x			x				x					x		x		x		
Formulate the Budget	x	x			x				x					x		x		x		
Implement the Budget	x	x			x				x					x		x		x		
Produce Outreach and Educational Materials	x	x			x				x					x		x		x		
OLMSA Annual or Inputs to Agency Annual Reports	x	x			x				x					x		x		x		
Respond to External Inquiries for Information	x	x			x				x					x		x		x		
Est Space Act Agreements	x	x			x				x					x		x		x		
Negotiate Cooperative Agreements	x	x			x				x					x		x		x		
Prepare Program Commitment Agreements	x	x			x				x					x		x		x		
Solicit, Evaluate, Select Enterprise Research	x	x			x				x					x		x		x		
Define and Establish Commercial Space Centers	x	x			x				x					x		x		x		
Conduct Commercial Research Flight Planning	x	x			x				x					x		x		x		
Conduct Flight Planning and Integration	x	x			x				x					x		x		x		
Renew Grants, Contracts & IAF Transfer Agreements	X	X			X				X					X		X		X		
Review/Approve OWIs	x	x			x				x					x		x		x		

Not Applicable ■

Appendix Revision Date:

Appendix E - QSM/OWI Matrix - Office of Aero-Space Technology

Office Work Instructions — Quality System Manual Elements

Code R	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Enterprise Strategic Plan Development, Maintenance & Approval	x	x	x	x	x				x					x		x		x		
Agency Policy Formulation, Approval, Promulgation	x	x	x	x	x				x					x		x		x		x
Ent./IPO Policy Form., Approval, Prom.	x	x			x				x					x		x		x		
Enterprise Budget Formulation and Approval	x	x			x				x					x		x		x		x
Capital Investment Planning and Oversight	x	x			x				x					x		x		x		
Enterprise Budget Execution	x	x			x				x					x		x		x		
HQ Budget Development	x	x	x	x	x				x					x		x		x		x?
HQ Budget Execution	x	x	x	x	x				x					x		x		x		x?
Advocacy, Outreach and Exterl Communications	x	x			x				x					x		x		x		
Review/Formulation of Interagency	x	x	x		x				x					x		x		x		
Review/Formulation of Int'l Agreement	x	x			x				x					x		x		x		
Advisory Committee Mgmt	x	x		x	x				x					x		x		x		
Program Formulation and Approval	x	x		x	x				x					x		x		x		
Program Oversight & Evaluation	x	x			x				x					x		x		x		x?
Contingency Planning	x	x	x		x				x							x		x		
Center Implementation Plan Review	x	x	x		x				x					x		x		x		
Performance Assessment	x	x			x				x					x		x		x		x

Not Applicable ■

Appendix Revision Date:

Appendix F - QSM/OWI Matrix - Office of Space Science

Office Work Instructions — Quality System Manual Elements

Code S	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Strategic Planning	x	x	x	x	x				x					x		x		x		x
Budget Formulations	x	x	x	x	x				x					x		x		x		x
Budget Justifications	x	x	x	x	x				x					x		x		x		x
Budget Impl. - Operating Plan	x	x	x	x	x				x					x		x		x		x
Budget Impl. - Cost Phasing Plan	x	x	x	x	x				x					x		x		x		x
Develop, Update PCA	x	x	x	x	x				x					x		x		x		x
Development of Program Plans	x	x	x	x	x				x					x		x		x		x
Cross-Enterprise Tech. Development	x	x	x	x	x				x					x		x		x		x
Focused/New Mil. Tech Development	x	x	x	x	x				x					x		x		x		x
NRA's for R&A	x	x	x	x	x				x					x		x		x		x
AO's for Space Flight Missions	x	x	x	x	x				x					x		x		x		x
Compete, Award JPL Contract	x	x	x	x	x				x					x		x		x		x
Evaluate, Approve JPL Award Fee	x	x	x	x	x				x					x		x		x		x
Launch Preparations	x	x	x	x	x	x			x					x		x		x		x
Performance Planning	x	x	x	x	x	x			x					x		x		x		x
Performance Assessment	x	x	x	x	x				x					x		x		x		x
Program/Project Assessment	x	x	x	x	x				x					x		x		x		x
Action Tracking	x	x		x	x				x					x		x		x		x

Not Applicable ■

Appendix Revision Date:

Appendix G - QSM/OWI Matrix - Office of Earth Science

Office Work Instructions — Quality System Manual Elements

Code Y	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**
Develop Enterprise Strategy	x	x			x				x					x		x		x		
Formulate ESE Budget	x	x			x				x					x		x		x		
Execute ESE Budget	x	x			x				x					x		x		x		
Advocate ESE Budget	x	x			x				x					x		x		x		
Generate Approved Press Release	x	x			x				x					x		x		x		
Generate Approved Response to Pending Legislation	x	x			x				x					x		x		x		
Formulate and Approve Flight Program	x	x			x				x					x		x		x		
Plan Science Research	x	x			x				x					x		x		x		
Identify & Solicit SA Research	x	x			x				x					x		x		x		
Identify & Solicit Applications Research	x	x			x				x					x		x		x		
Identify & Solicit Educational Projects & Activities	x	x			x				x					x		x		x		
Formulate Technology Development Program	x	x			x				x					x		x		x		
Conduct Peer Review	x	x			x				x					x		x		x		
Selecting Proper Solicitation Instrument	x	x			x				x					x		x		x		
Obtain Approval for Release of Solicitation Instruments	x	x			x				x					x		x		x		
Evaluate Flight Program	x	x			x				x					x		x		x		
Approve Quality Documents	x	x			x				x					x		x		x		

Not Applicable ■

Appendix Revision Date: